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Project 1-2
A Titanic Space Odyssey!

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Abstract

To be filled

1 Introduction

This report "A Titanic Space Odyssey!" covers various skills apprehended in this Semesters courses such as Data Structures and Algorithms, ICT and Knowledge Management, Calculus, Software Engineering, Logic as well as Numerical Mathematics. Especially the later Numerical Mathematics is of great importance to tackle the tasks demanded in this project. Basically the Project consists of landing a manned mission on Titan, a moon of Saturn. The Project is split into three Phases. In the first Phase data on the solar system such as planetary masses was collected, in order to create a mathematical model of the solar system. In addition to the model a physics engine is implemented to perform a launch and landing of a spaceship. First the goal is simply to hit Titan starting from earth and later incrementally improve the simulation in Phase 2 and Phase 3.

The improvements of Phase 2 are a landing on Titan once the orbit is reached. An improvement of the solar system simulation by implementing a higher order differential equation solver is also suggested. The landing itself can be done by 2 different strategies. Firstly there is the open-loop controller which operates without taking the input data into account for computing the trajectory. Secondly there is a feedback controller, which as the name suggest, adjusts the landing according to the initial conditions of the landing. In other words if the landing probe velocity reaches an unsafe speed it uses the thrusters to slow down the landing velocity.

Phase three's main objective is the Mission back from Titan to Earth. Aftwerwards, the next goal is to reduce the fuel consumption to a minimum in a first step. Then, in a second step, the aim is to reduce the trip's time with a fuel consumption of up to 1.5 times the minimum fuel consumption.

1.1 Background

2 Phase 1: Exploratory missions

Phase 1 tasks from the red Handbook.
Details on what we did in Phase 1.

3 Phase 2: Landing on Titan

Phase 2 tasks from the red Handbook.
Details on what we did in Phase 2.

4 Phase 3: Space race to Titan

Phase 3 tasks from the red Handbook.
Details on what we did in Phase 3.

5 Conclusions and recommendations

Literature

[Chhajed, Lowe] Dilip Chhajed and Timothy J. Lowe (Eds.), 2008, *Building Intuition*, Springer US, 1. edition, ISBN: 978-0-387-73698-3